

CLAIMS

We Claim:

1 1. A color sensor implemented on a single, integrated circuit chip, the
2 color sensor comprising:
3 a plurality of color sensor circuits, each color sensor circuit in the
4 plurality of color sensor circuits including:
5 a light detector,
6 an amplifier connected to the light detector, the amplifier
7 amplifying a signal from the light detector, and
8 a gain selection circuit, connected to the amplifier, the gain
9 selection controlling gain of the amplifier, the gain selection circuit including a
10 variable feedback resistance; and,
11 a gain selection control that selects a separate value of the variable
12 feedback resistance for each color sensor circuit.

1 2. A color sensor as in claim 1 wherein the plurality of color sensor
2 circuits include a red color sensor circuit, a green color sensor circuit and a blue
3 color sensor circuit.

1 3. A color sensor as in claim 1 wherein the plurality of color sensor
2 circuits include a red color sensor circuit, a green color sensor circuit, a blue
3 color sensor circuit, and a white color sensor circuit.

1 4. A color sensor as in claim 1 wherein for each color sensor circuit in the
2 plurality of color sensor circuits, the variable feedback resistance comprises:
3 a plurality of resistors connected in series; and,
4 a plurality of switches connected to the plurality of resistors, the gain
5 selection control selecting the value of the variable feedback resistance by
6 controlling the plurality of switches.

1 5. A color sensor as in claim 1 wherein the gain selection control selects
2 the separate value of the variable feedback resistance for each color sensor
3 circuit so that for each color sensor circuit any selected range from a selected
4 minimum illuminance to a selected maximum illuminance is guaranteed to
5 utilize at least a predetermined percentage of a full voltage range provided the
6 selected maximum is within a predefined range.

1 6. A color sensor as in claim 1 wherein the amplifier is a multi-stage
2 amplifier.

1 7. A color sensor as in claim 1 wherein the amplifier is a multi-stage
2 amplifier with separate gain selection at multiple stages.

1 8. A color sensor as in claim 1:
2 wherein the gain selection circuit additionally includes a variable
3 compensation capacitance; and,

4 wherein the gain selection control selects a value of the variable
5 compensation capacitance.

1 9. An integrated circuit chip comprising:
2 a light detector;
3 an amplifier connected to the light detector, the amplifier amplifying a
4 signal from the light detector;
5 a gain selection circuit, connected to the amplifier, the gain selection
6 controlling gain of the amplifier, the gain selection circuit including:
7 a variable feedback resistance, and
8 a variable compensation capacitance; and,
9 a gain selection control that selects a value of the variable feedback
10 resistance and a value of the variable compensation capacitance.

1 10. An integrated circuit chip as in claim 9, additionally comprising:
2 a second light detector;
3 a second amplifier connected to the second light detector, the second
4 amplifier amplifying a signal from the second light detector; and,
5 a second gain selection circuit, connected to the second amplifier, the
6 second gain selection controlling gain of the second amplifier, the second gain
7 selection circuit including:
8 a second variable feedback resistance, and
9 a second variable compensation capacitance; and,

10 wherein the gain selection control selects a value of the second variable
11 feedback resistance and a value of the second variable compensation capacitance.


1 11. An integrated circuit chip as in claim 10, additionally comprising:
2 a third light detector;
3 a third amplifier connected to the third light detector, the third amplifier
4 amplifying a signal from the third light detector; and,
5 a third gain selection circuit, connected to the third amplifier, the third
6 gain selection controlling gain of the third amplifier, the third gain selection
7 circuit including:
8 a third variable feedback resistance, and
9 a third variable compensation capacitance;
10 wherein the gain selection control selects a value of the third variable
11 feedback resistance and a value of the third variable compensation capacitance.

1 12. An integrated circuit chip as in claim 11 wherein the light detector
2 includes a red filter, the second light detector includes a green filter and the
3 third light detector includes a blue filter.

1 13. An integrated circuit chip as in claim 9 wherein the variable feedback
2 resistance comprises a plurality of resistors connected in series.

1 14. An integrated circuit chip as in claim 9 wherein the variable feedback
2 resistance comprises:
3 a plurality of resistors connected in series; and,
4 a plurality of switches connected to the plurality of resistors, the gain
5 selection control selecting the value of the variable feedback resistance by
6 controlling the plurality of switches.

1 15. An integrated circuit chip as in claim 14 wherein the variable
2 compensation capacitance comprises:
3 a plurality of capacitors connected to a second plurality of switches,
4 wherein the gain selection control selects the value of the variable compensation
5 capacitance by controlling the second plurality of switches.

1 16. An integrated circuit chip comprising: 
2 a light detector;
3 a multi-stage amplifier connected to the light detector, the amplifier
4 amplifying a signal from the light detector;
5 a plurality of gain selection circuits, each of the plurality of gain selection
6 circuits being connected to a separate stage of the multi-stage amplifier, each of
7 the plurality of gain selection circuits including a variable feedback resistance;
8 and,
9 a gain selection control that selects a separate value for the variable
10 feedback resistance within each of the plurality of gain selection circuits.

1 17. An integrated circuit chip as in claim 16 wherein each variable
2 feedback resistance comprises a plurality of resistors connected in series.

1 18. An integrated circuit chip as in claim 16 wherein each variable
2 feedback resistance comprises:
3 a plurality of resistors connected in series; and,
4 a plurality of switches connected to the plurality of resistors, the gain
5 selection control selecting the value of the variable feedback resistance by
6 controlling the plurality of switches.

1 19. An integrated circuit as in claim 16:
2 wherein each of the plurality of gain selection circuits includes a variable
3 compensation capacitance; and,
4 wherein the gain selection control selects a separate value for the variable
5 compensation capacitance within each of the plurality of gain selection circuits.

1 20. An integrated circuit chip as in claim 19 wherein each of the variable
2 compensation capacitance comprises:
3 a plurality of capacitors connected to a plurality of switches, wherein the
4 gain selection control selects the value of the variable compensation capacitance
5 by controlling the plurality of switches.